<u>CLAIMS</u>

1. A process of producing new catalysts according to an evolutionary process by selecting solid materials of different compositions and restructuring the original catalysts and subsequent catalyst generations by means of stochastic methods and determination of the performance parameters of the respective catalyst generation and selection of mixed catalysts of one or more catalyst generations, which comprises the fact that

the restructuring, when based on the principle of crossing, takes place in such a manner that

a mixed catalyst is randomly selected from a generation of catalysts by means of a numerical random generator with a uniform distribution, and a second mixed catalyst is selected from the same generation with the probability W_i by means of one or more numerical random generators with a uniform distribution, where W_i is determined by the specification

$$W_i = \frac{\left(\sum_{j=1}^{n} j\right) - i}{\left(\sum_{j=1}^{n} j\right)}$$

where i and j denote the ranking of the catalysts of one generation, ranked in order of decreasing catalytic activity, and n denotes the number of catalysts in one generation,

and then at least one individual component which is present in only one of the two catalysts is selected from the two mixed catalysts to be crossed according to the random principle by means of a numerical random generator with a uniform distribution, and two new catalyst compositions of the next generation are determined in such

a way that the selected component is then added to the catalyst which did not contain this component in the preceding generation, while the component in the catalyst originally containing it is omitted,

and

restructuring of a catalyst of the next generation, when based on the principle of mutation, takes places in such a manner that

first a mixed catalyst is randomly selected from a catalyst generation by means of a numerical random generator with a uniform distribution from a catalyst generation, then a single component is selected by the random principle by means of a numerical random generator with a uniform distribution and, if this single component is already contained in the catalyst, it is removed or, if not previously present in this catalyst, it is added to it.

2. A process according claim 1, wherein the preferred number of generations is between 5 and 50.

3. A process according to claim 1, wherein the preferred number of individual components in the first generation is between 10 and 30.

4. A process according to claim 1, wherein the preferred number of individual components in a mixed material of the first generation is between 3 and 10.

5. A process according to claim 1, wherein the program codes G05DYF, G05DZF, G05CAF, G05CCF of the NAG Library [NAG FORTRAN Workstation Library, NAG Group Ltd., 1986]) are selected either alone or in combination with one another

as the random generators and are used for the stochastic methods of mutation and crossing.

6. A process according to claim 1, wherein the composition of the gas stream is varied in determination of the performance parameters of the newly structured material compositions of the next generations.

7. A process according to claim 1, wherein the space velocity of the gas based on the catalyst mass is varied in determination of the performance parameters of the newly structured material compositions of the next generation.

8. A process according to claim 1, wherein the temperature is varied and the determination of the performance parameters of the newly structured material compositions of the next generation.

9. A process according to claim 1, wherein the composition of the gas stream, the space velocity of the gas based on the catalyst mass and the temperature are varied according to the principles of mutation and crossing to determine the performance parameters of the newly structured material compositions of the next generations.